

ing a wide variation. In several cases the combs are combined to form composite figures. In the opinion of the authors the four phases represented extended over a long period, from Aurignacian to Neolithic times. The pictures are, although inferior in execution, closely related to those of Altamira, Niaux, and Font de Gaume, while the signs and symbols follow closely the rock engravings of Portuguese South-east Africa.

The most outstanding feature is the appearance of fish among the animal forms. The fish represented are of the Plaise or Brill family, and form the only instance so far known of fish painted on the walls of a cave, although engravings of fish have been reported from Pindal, Niaux, and "La Gorge d'Enfer." The book is admirably illustrated, and maintains in every way the high level which we have come to associate with the publications of the Institut de Paléontologie Humaine de Monaco.

WILLIAM WRIGHT.

#### BACTERIOLOGICAL RESEARCH IN BOMBAY.

THE report of the Bombay Bacteriological Laboratory for the year 1914, by Major W. Glen Liston, reached this country recently. The report is divided into two parts: (1) that dealing with plague work, and (2) that dealing with general preventive medicine. Statistics are furnished which tend to show that the uninoculated are attacked three times more frequently than the inoculated (against plague). One drawback to the use of plague vaccines is the severe reaction which follows, deterring others from undergoing the operation. It is now suggested, as results of experiments on rats and observations on man, that a small initial dose of 1-2 c.c. should be given, to be followed in a week by a second dose of 2-4 c.c. It appears that there are two other species of fleas of the genus *Xenopsylla*—viz., *X. brasiliensis* and *X. astia*—besides the originally known species *X. cheopis*, which, however, forms 80 per cent. of the three species concerned. Whether they all transmit plague is a question which must arise. The results of the examination of rats in the laboratory show that both in the case of *M. rattus* and *M. decumanus* there is a rise above the mean in the rate of infection in the latter half of January, whereas the rise above the mean in human plague mortality occurs in the first half of March. The fall below the mean occurs at the same time for both species of rats and for man—viz., in the first half of June. The summit of the infection for *M. rattus* precedes that of *M. decumanus* by a fortnight, while the infection of the latter and the mortality in man reach their maximum at the same time—viz., in the latter half of April.

It is disheartening to see in connection with the prevalence of guinea worm in the town of Ranebennur that years have passed in a fruitless discussion of various plans to improve the water supply of this town. The guinea worm infection is 1.45 per cent. In the village of Desai it is

calculated that the extermination of guinea worm would result in a net gain of 219 rupees per annum. Here, as elsewhere, sanitation always means a net cash gain in the end. The nature of rat-bite fever is unknown, but the fact that salvarsan rapidly cures it suggests a spirochæte origin. A "number of cases" came under observation; but why not state the actual number? The report, though short, contains much of interest and evidence of good, sound work.

J. W. W. S.

#### NOTES.

WE record with deep regret the death on September 16, in his seventy-third year, of Sir Lauder Brunton, Bt., F.R.S., consulting physician to St. Bartholomew's Hospital, and of high distinction by his work and teaching in physiological medicine.

WE regret to see in the *Morning Post* the announcement of the death of Prof. Pierre Duhem, professor of theoretical physics in the University of Bordeaux, and the author of several works of wide interest on the history of natural philosophy and physical subjects.

ONE of the incidental effects of the European war upon America is the stimulus it has given to the adoption of the metric system. Very many American factories now turning out munitions for the Allies are working almost entirely in metric dimensions. Even locomotives are being manufactured in metres and millimetres. "The same thing, in all likelihood," says the *New York Evening Post*, "is taking place in England, which is furnishing munitions for Russia and other of her Allies."

A NEW YORK telegram announces the death on September 18, at sixty-six years of age, of Mr Seth Low, president of Columbia College from 1889 to 1901, during which period the college became Columbia University. Referring to his work for the university, the *Times* says: "He did much by his businesslike administration, his liberality (he personally contributed 200,000l. to the fund which enabled it to be removed to its magnificent site on Morningside Heights, New York City), and his especial interest in the department of political science."

THE Sociedad Argentina de Ciencias Naturales, of Buenos Aires, which issues the journal *Physis*, has arranged to hold meetings similar to those of the British Association, every two years, in one of the towns of the Argentine. No scientific assembly of this kind has hitherto been held in South America. The first meeting will be held at Tucuman in the last week of November next, in commemoration of the first centenary of the declaration of the independence of the Argentine Republic in 1816. Tucuman is the busiest and most populous town in the north of the republic. It possesses a university, a Museum of Natural History, of which Prof. M. Lillo is director, two agricultural experiment stations, and other institutions of scientific interest. The Governor of the State, Don Ernesto Padilla, is honorary president of the local committee for the meeting. The president of the whole assembly will be Prof. A. Gallardo, director of the Buenos Aires Museum; and the Minister of Public Instruction will be the honorary president. There will be nine sections, which, with their presidents, will be as follows:—I., Geology, Geography, and Geophysics, M. Enrique Hermitte; II., Palæontology, M. Carlos Ameghino; III., Botany, Prof. C. M. Hicken; IV.,

Zoology, Dr. E. L. Holmberg; V., General Biology, Anatomy, and Physiology, Prof. J. Nielsen; VI., Anthropology, M. J. B. Ambrosetti; VII., Physical and Chemical Sciences, Prof. E. H. Ducloux; VIII., Applied Natural Sciences, M. T. Amadeo; IX., Education in the Natural Sciences, Prof. V. Mercante. The general secretary of the Congress is Prof. M. Doello-Jurado, to whom communications should be addressed at rue Perú No. 222, Buenos Aires.

THE *Morning Post* of September 13 gives a brief account of a ship constructed of concrete with steel ribs, ordered by M. Broström, the Swedish Minister of Marine. The ship appears to be about one thousand tons in displacement, and resembles a large barge. It is said that it is proposed to construct concrete ships of from 15,000 to 20,000 tons displacement, and a vessel of 3000 tons is now under construction. Our contemporary is not correct in describing this ship as the first stone vessel ever floated. Thus *Engineering* of June 14, 1912, gives a description and drawings of the first reinforced-concrete pontoon built in this country and used for sludge pumping on the Manchester Ship Canal. This vessel was constructed on the Hennebique system, designed by L. G. Mouchel and Partners, of Westminster, and was 100 ft. long by 28 ft. wide by 8.5 ft. deep; there were four transverse and two longitudinal bulkheads, and a complete installation of steam-pumping machinery. The first reinforced-cement boat appears to have been built by M. Lambot-Miravel in 1849, and was exhibited at the Exposition Universelle of 1855. An early example of ferro-concrete barge-building is the vessel completed in 1906 for M. Grancher, of Aveyron, in France, and employed regularly for sand dredging. Numerous other barges and pontoons of this type of construction have been built for use on the Tiber, Panama Canal, and elsewhere. There are, no doubt, possibilities in the development of ferro-concrete vessels, but we do not expect to hear in the near future of Transatlantic liners built on this plan.

In the autumn of 1815, the year of Napoleon's final downfall, the Société helvétique des Sciences naturelles was founded at Geneva. It may, however, be called the offspring of two earlier societies, one representing the physical, the other the biological side of science, the older of which dated from 1791, and had thus survived the troubles inflicted by the French revolution. Small at first, it grew rapidly, and among the foreigners who attended its jubilee were Frankland and Tyndall. From the first it was a publishing society, and has now issued a fiftieth volume, in commemoration of its centenary, which was celebrated last year. This consists of reports from leading members of the society, which cover every branch of its work in the past and at the present time, together with short biographical notices of the workers themselves, many of them never to be forgotten by any scientific lovers of the Alps. The result is a very interesting volume, which will also have a permanent value in facilitating reference to the more important papers—and these are not few—which have been published by the Society. It has dealt with almost every branch of natural knowledge, for a mountain chain like the Alps propounds to the physical geologist not a few difficult problems, and as its climatic zones range from temperate to polar regions, it affords successive illustrations of their flora and fauna. The volume, in short, summarises the work of at least three generations of enthusiastic naturalists, workers at geology, physical geography, and meteorology, botany and zoology, past and present, and archæology (among whom we must not forget the earliest investigators of pile dwellings). One of the

society's committees has also greatly aided in the systematic study of glaciers. It is interesting to learn that the idea of these having once extended far beyond their present limit occurred independently, in the year of the society's birth, to an engineer, Ignace Venetz, and to a chamois hunter of the Val de Bagnes named Perraudin.

THE *Electrician* was started as a weekly journal in 1861, when telegraphy was almost the only electrical industry. It came to an end in 1864, but was revived in 1878, at a time when the applications of electricity were becoming more numerous, and since then has always occupied a leading place amongst the electro-technical journals. In commemoration of the appearance of the 2000th number, which was issued on September 15, special articles are included in the number dealing with the development of the various branches of the electrical industry, and written by experts. As they touch on the principal events only, they are not too long for the general reader, and should prove of great value to the worker in one branch who wishes to know something of the history of those parts of the industry with which he is not immediately brought into contact. In addition to these historical articles there are others dealing with the present position of affairs in the industry and in the country which deserve careful consideration. Dr. Waalsley, as a teacher, urges the authorities to stop depleting the universities and technical colleges of the engineering and chemical students whose services will be so much needed by the country when the war is over. While on one hand the report of the Committee of the Privy Council for Scientific and Industrial Research expresses the pious hope that "voluntary efforts of manufacturers in friendly union" will succeed in raising the general level of manufacture in this country, on the other we find Mr. Swinburne putting forward the view that the manufacturer should be left to work out his problems in his own way.

In the September issue of *Man* Prof. Seligman illustrates and describes a primitive form of reaping knife used by the sedentary Arab tribes of northern Kordofan. It can scarcely be called a sickle, consisting of an iron blade, more or less razor-shaped, and having at right angles at each end a small tang, which is thrust into a wooden handle. The blades are said to be made by the Arabised descendants of the pre-Arab iron-working Nuba, who still dwell on the hills which dot the plains of northern Kordofan. In reaping the dura the heads are cut off, with only a few inches of stalk, the stems being left in the ground until thoroughly dry, when they are pulled up and used for thatching, fencing, and other purposes. He remarks that this example may possibly indicate the purpose of a form of stone knife found in Europe in Neolithic times, as in the pile dwellings of Locras, whence comes the specimen now in the Sturge collection.

MR. W. H. D. LE SOUEF has reprinted from the Journal of the Royal Geographical Society of Australasia an interesting paper on "Aboriginals' Culinary Methods and Kitchen Middens." He remarks that, as regards food, little came amiss to them that was not absolutely poisonous. They did not eat any animal or bird they found dead unless they knew how it had been killed, and not even then unless it was fairly fresh, as they objected to meat that was much fly-blown. Slightly tainted meat did not trouble them much; they only cooked it a little more. Some of the mounds at which they used to cook their food are of large extent, as much as 100 ft. in diameter. Unfortunately many of these have been occupied by rabbits, and have thus suffered much injury. As

many of the kitchen middens along the coast are becoming eroded, the author suggests that a photographic record of them should be prepared before it is too late.

In the *Memoirs of the Connecticut Academy of Arts and Sciences* (vol. v., 1916, pp. 1-96, plates i.-xxxix.) Dr. G. F. Eaton publishes an exhaustive report on the human skeletons from Indian graves at Machu Picchu, Peru, obtained by the Yale University Expedition of 1912. Most of the burials were in caves, and the mummies seem to have been placed sitting in the contracted position. A large proportion of the skeletons were imperfect, and Dr. Eaton suggests that many deficiencies were caused by accident when the mummies were temporarily removed from their burial places during festivals, in accordance with a well-known custom under the rule of the Incas. Of 164 skeletons collected, no fewer than 109 were certainly of females, while most of the male skeletons represented individuals of inferior physical development. Bronze and bone implements, objects of green chloritic schist, earthenware spindle-whorls, and fabrics both of llama's wool and of vegetable fibre, besides a large collection of well-preserved pottery, are also described and figured. The rare articles of post-Columbian or European origin are to be regarded as having been introduced after the original burials.

SINCE the classic work of Gaudry on the late Miocene or early Pliocene mammals occurring in bonebeds at Pikermi, near Athens, discoveries of deposits containing similar mammalian remains have multiplied in eastern Europe. During recent years many have been made, especially in southern Russia, and various preliminary notices of them have appeared. Madame Marie Pavlow has now thoroughly investigated these discoveries, and published the results in a handsome memoir which forms the third and fourth livraisons of vol. xvii. of the *Nouveaux Mémoires* of the Imperial Society of Naturalists of Moscow. A description of the geological formations whence the fossils were obtained is appended by Prof. Alexis P. Pavlow. So far as known, the Russian fauna, with the usual preponderance of Hipparion, is remarkably like that of Pikermi, the only striking difference being the absence of the true Rhinoceros. After describing remains of giraffes, Madame Pavlow discusses a well-preserved skull of Palæotragus, which she maintains is an antelope, not a giraffe, as supposed by Forsyth Major. There are also remains of other well-known antelopes and gazelles, a few fragments of deer, and a fine skull of the large pig, *Sus erymanthius*. Several skulls of a hornless rhinoceros, *Aceratherium*, closely related to a species found at Maragha, in Persia, are important as making known several growth-stages. The numerous skulls and jaws of *Hipparion gracile* are also valuable for the same reason. Teeth of Mastodon, Dinotherium, and Orycteropus occur, and there are some fragments of Carnivora, including the skull of a large cat related to the American Miocene *Pogonodon*. Madame Pavlow has already made many welcome contributions to our knowledge of the newer Tertiary mammals of Russia, and she is to be congratulated on the manner in which she has presented the latest results of her researches.

BEFORE the war Russian men of science, and especially biologists, had to send a very considerable proportion of their writings abroad for publication, and the German journals thus became the common medium for much of the best Russian work. Soon after the outbreak of war efforts were made to remedy this state of affairs; of the new journals, Profs. Skimke-

witch and Dogiel are editing the *Russian Journal of Zoology*, Profs. Sewertzoff and Elpatiewsky the *Revue Zoologique Russe*, and Prof. Dogiel the *Archives Russes d'Anatomie, d'Histologie et d'Embryologie*. The first number of the latter has just appeared; it contains an article in English by A. Mamimov on "The Cultivation of Connective Tissue of Adult Mammals *in vitro*," and two memoirs in French, one by the editor on the structure of sensory nerve-endings in the beak and tongue of birds, and another by A. N. Sewertzoff on the morphology of the skull and head muscles of Cyclostomes. The excellence of these researches, no less than of the typography and illustrations, is a happy augury of the success of this new journal, on which Prof. Dogiel of Petrograd is to be heartily congratulated. It is of particular interest to note that, in spite of the enormous drain on the Imperial finances, the Minister of Public Instruction, Count Ignatiev, made the publication of this journal possible by a Government subsidy.

IN the *Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou*, M. G. A. Belogolov records some very remarkable experiments on the development of the frog *Pelobates*. The experiments were undertaken with the view of throwing some light upon the factors that are concerned in bringing about the phenomena of recapitulation in ontogeny. Their significance from this point of view may be regarded as somewhat obscure, but at any rate they have yielded some very curious results, and perhaps it is not too much to say that they have opened up a new field in the domain of experimental embryology and pathology. The author's intention was to rear the embryos as parasites upon adults of the same species, instead of as free-living individuals in their normal aquatic environment. He introduced the eggs into the body-cavity of the adult through an incision in the body-wall, and found that they attached themselves to the surface of the various viscera, etc., and in the course of a few weeks developed into highly abnormal structures, sometimes permeated by blood capillaries apparently derived from the tissues of the adult, through which they derived their nutriment. These results will probably be of interest to pathologists rather than to embryologists, especially from the point of view of those engaged in cancer research. The necessary operation appears to be a very simple one, but the animals treated as hosts to the parasitic embryos remained alive but for a few months, and then only when kept in water. The memoir is well illustrated, the histological features of the parasites being represented in two very beautiful and elaborate coloured plates.

THE *Bull. Imp. Acad. Sci.* (Petrograd, May, 1916) contains the description of a new species, differing in many essentials from other species, of *Helicoprion*, *Helicoprion clerci*, so named in honour of Onisime Jegorovič Klerk (O. Clerc), president of the Ural Naturalists' Society. Accompanying the description are drawings in natural size of the five fragments found at Krasnoufimsk. So far only two species have been discovered in Russia—*Helicoprion besonovi* and another, hitherto undescribed, found by A. P. Ivanov in the Government of Moscow. The well-known American naturalist, C. R. Eastman, directed attention in 1905 to the instructiveness and unexpectedness of certain palæontological discoveries of recent years, pointing out specially *Pareiasaurus* among the Reptilia, *Helicoprion* among the Pisces, and *Dæmonohelix* among the problematical forms. The nature of this last fossil has now been finally settled. Eastman,

as an ichthyologist, focussed his attention on Heliopon and allied forms, Edestus and others. Since then the interest in them has not waned, and the literature of the subject grows apace.

THREE valuable essays appear in the Proceedings of the Birmingham Natural History and Philosophical Society, vol. xiv., part 1. The first of these is by Mr. Leonard J. Wills, on "The Structure of the Lower Jaw of Triassic Labyrinthodonts." The author's investigations were based upon fragments of Labyrinthodont mandibles found in the Lower Keuper Sandstone of Bromsgrove, Worcestershire. The author comes to the conclusion that the Stegocephalian mandible helps to bridge over one of the gaps between the fishes and the reptiles. The jaw of the latter can be derived from the Stegocephalian mandible by a fusion or suppression of some of the elements, such as was probably taking place, even in Permian and Triassic times, in the case of the coronoid bones. The second concerns the geology of the eastern boundary fault of the South Staffordshire coalfield. The author, Mr. W. H. Foxall, describes the coal-beds, the Red beds, the Bunter Pebble beds, and the Glacial drift. The third, illustrated by numerous photographs and diagrams, is contributed by Prof. W. S. Boulton, who deals at length with the problems presented by an Esker near Kingswinford, South Staffordshire. The events recorded, the author believes, happened towards the close of "the Ice age, when the ice had ceased to advance; when, indeed, it was melting faster than it could be replenished from the northern Highlands, and the ice-front, in consequence, was slowly retreating northward."

SOME authoritative statement is required to discourage the popular belief that the heavy rains experienced this summer are connected with the bombardment in France and Flanders. In the Meteorological Office Circular, No. 3 (August 21) there is a note on the subject. Experiments to test this hypothesis have been made in Europe, America, Alaska, and Australia, but without result, and there is no evidence of any such influence. Furthermore, the energy of the heavy bombardment now proceeding, even if applied entirely to the removal of the heat required to produce rain, which it is not, would be inadequate for the purpose. Nor must the spells of brilliantly fine weather be forgotten. These occurred while the bombardment was proceeding.

In an article in the *Geographical Review* for August, 1916 (vol. ii., No. 2), on the pirate coasts of the Mediterranean, Miss E. C. Semple points to the parallel between the hunting grounds of the German and Austrian submarines and those of the ancient and mediæval corsairs. Mediterranean piracy has recrudesced whenever maritime political control is relaxed, and certain localities determined by geographical conditions are the natural hunting-ground of the sea-robbers. The configuration of the basin has always compressed traffic into certain narrow routes. From these routes traffic is unable to deviate, as it can in the open ocean. The nodal points on the routes—that is, where land restricts traffic to a more or less narrow strait—have been especially favourable to pirates. Not only are they more sure of much prey at these points, but they stand a better chance of escape to their lurking places along the indented coasts. The paper is an excellent survey of the physical conditions of the Mediterranean that on one hand favoured legitimate seamanship, and on the other that debased form which manifests itself as piracy.

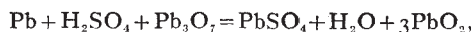
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THE report for 1915 of the director of the Liverpool Observatory, Bidston, shows that the ordinary work of the observatory has been carried out during the past year, while progress has been made in at least one direction. Besides the Milne seismograph, a new instrument, designed by Mr. J. J. Shaw, has been erected to record the tilt produced by the oscillations of the tidal load in the neighbourhood, and is working with good results. The number of earthquakes registered during the year is 195. A small record was obtained of the Carlisle earthquake of October 2, the oscillations of which lasted for a quarter of an hour.

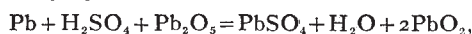
ATTENTION may be directed to the Monthly Record of Meteorological Observations, published by the Meteorological Service of Canada, of which we have received the number for March. It contains in a convenient form the complete meteorological data of some thirty stations in Canada, and also from Newfoundland and Bermuda. The publication contains two maps, one illustrating the total precipitation for the month, and the other the departure from the average temperature for the month. In addition to the stations providing detailed records, there are a large number for which only the monthly means and the extremes are given. There is, of course, a lack of data from the north of Canada. The monthly record contains no discussion of the data.

THE value of fique, the fibre of *Furcraea gigantea*, in Colombia is emphasised in a short article in Kew Bulletin No. 7 by Mr. M. T. Dawe, Director of Agriculture in Colombia. It is used for the soles of the native shoes or alpargatas, sacks, girths, ropes, matting, and even for roofing the houses. For the latter purpose the green leaves are used, and the article is illustrated by a photograph showing a cottage thatched with the leaves of fique. Hand-prepared fibre is sold in the Bogotá market at 6d. per lb., but by using modern machinery a profit of 19l. per ton might be expected if the fibre sold at its present wholesale price of 160 dollars per ton. On export with a selling price of 25l.-30l. per ton a profit of 5l.-10l. per ton should be realised.

WITH a view to the ultimate production of a portable dry storage cell, M. Charles Féry has, with the help of his pupil, M. E. Fournier, examined quantitatively the chemical changes which take place in the ordinary storage cell. His results will be found in the January number of the *Journal de Physique*. He finds that neither the simple theory of sulphation of both positive and negative plates first put forward by Gladstone and Tribe, nor the later theories involving the production of an unstable higher sulphate at the positive plate are in agreement with the measurements. In the first place, the amount of sulphuric acid which disappears during the discharge of the cell is half that required by the double sulphation theory. In the second place, the change of weight of the positive plate is much less than it should be according to that theory, and takes place in the opposite direction. His final conclusion is that the reactions which take place during discharge of the cell may be represented by the equation



or possibly by



The former involves the production of 15 grams of peroxide per ampere hour, the latter 10.4. In actual practice 12 to 14 grams are produced.